

# Socio-Economic Importance of Non-Timber Forest Products and Its Implication on Natural Forest Conservation: The Case of Jello-Muktar Forest, Southeastern Ethiopia

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## Abstract

The study was conducted to investigate the socio-economic importance of non-timber forest products in Jello-Muktar protected forest located between 8°55'N-9°05'N latitude and 40°50'E-40°51'E longitude in south-eastern Ethiopia. Stratified random sampling technique was used to collect data by using both formal and informal survey. Informal survey was conducted using semi-structured questionnaire and structured questionnaire was used for formal survey. From a total of 900 households living in the vicinity of the forest, 10% of the households were randomly selected for interview and discussions. Households were stratified according to wealth categories; rich, medium and poor based on their farmland size hold and off-farm activities. Survey of four local markets was also conducted to assess collection of data about the number of non-timber forest products sellers involved in each selected market place, the type of products supplied to these markets and to provide information on the importance of non-timber forest products to the household economy as a means of supplementing gaps in the household survey. The result indicated that all households interviewed make use of non-timber forest products to a greater or lesser extent. Nine categories of non-timber forest products were identified which include traditional medicine, household utensil, honey, fuelwood, farm implement, animal fodder, edible wild food, smoking/flavouring products, and spices. Sale of non-timber forest products was found to contribute 36 %, 9% and 4% of their average annual income for the poor, medium and rich households, respectively. The poor households generate more income from the sale of non-timber forest products than the medium and rich households. NTFPs business also provides employment opportunity for the local people. On average 340 individuals per market day are engaged in NTFPs sale in four local markets found around the forest. The use of non-timber forest products was found to be significantly influenced by farmland size hold, off-farm activities and age of the head of the household ( $p < 0.01$  and  $P < 0.05$ ). This investigation showed that non-timber forest products harvested from the forest contribute to the livelihood of households residing in the vicinity of the forest. Therefore, the management plan of Jello-Muktar forest should include the contribution and sustainable utilization of non-timber forest products.

**Keywords:** Wealth category; Household; Non-Timber Forest Products; Socio-economic; Forest Resource

## 1. Introduction

The harvesting and consumption of Non-timber forest products (NTFPs) from natural forests is known to account for a large proportion of the livelihood of people living close to such habitats (Padoch, 1992; Godoy and Bawa, 1993). During famine, NTFPs become essential to human survival, and at other times they both prevent the need for cash expenditure and provide a source of income to cash-poor households (Padoch, 1992). Between 4000 and 6000 NTFPs have been cited to be of commercial value (Osemeobo, 1991), at least 150 NTFPs had been documented as important in terms of international trade (FAO, 1997). It is estimated by the FAO that the total value of internationally traded NTFPs is about 1.1 billion US Dollars annually. However, the link between the economic benefits of Non-timber forest products and their resource base (including local availability and sustainability) and sources is poorly understood (Hammet, 1999).

In the past, the rationale for forest conservation was simply to sustain the forests' productive role for the timber industry. Arnold and Ruiz Pérez, (1998) have reported that Non-timber forest products in some cases may contribute to the rural livelihood much better than timber products due to the fact that timber growing has a very long gestation period, whereas NTFPs play an important role in providing seasonal employment and income to villagers (Prasad, 1999). Mulugeta (2006) also reported that in Ethiopia national-level gum and resin production and processing related business hosted more than 2-3 times of employees hosted by forest industry (timber-related industries) where forest based industry employment hosted only 9,583 employees compared to 20,000 - 30,000 employees in the gum and resin production and processing related business.

In the recent years, NTFPs have attracted considerable global interest. This is due to the increasing recognition of the fact that NTFPs can provide important community needs for improved rural livelihood; contribute to household food security and nutrition; help to generate additional employment and income; offer opportunities for NTFP based enterprises; contribute to foreign exchange earnings; and support biodiversity and other conservation objectives (FAO, 1995; (Getachew and Wubalem, 2004; Tsegaye *et al.*, 2004).

NTFPs constitute a critical component of food security and an important source of income for the poor in many developing countries. In the past, the rationale for forest conservation was simply to sustain the forests' productive role for the timber industry. However, in many countries over the past 15 years, another view has emerged that formally acknowledges the importance of local use of forests (Marla and Rebecca, 2001).

In Ethiopia NTFPs play significant role in subsistence as well as in marketing economy. The country is well known for its rich and vast biodiversity resources that have numerous NTFPs. The rich NTFPs of the country play substantial roles in food security and in poverty alleviation for a large number of communities in the country (Vivero, 2002). Study by Demel and Mulugeta, (2005) indicated that over 80% (approximately 60,000,000) of the population of Ethiopia depend on herbal/wild medicines for their primary health care and biomass-derived fuel for their energy.

Like other developing countries, the production of fuelwood and environmental protection have been the primarily rationales for forest conservation and developments in Ethiopia. The uses of many NTFPs have been neglected. In such cases, the need may be to popularize the uses of such products and link them with the existing or potential market. Furthermore, the capacity to promote sustainable NTFPs production and utilization and to facilitate increased financial benefits to local and national users as an incentive for forest conservation has been very low or nonexistent in the country. On the other hand, a closer assessment of the real socio-economic significance of the forest and woodland resources of the country clearly reveals their greater importance with regard to the supply of NTFPs. Despite Ethiopia's forest-products-related export materials which were mainly of NTFPs like gums, incense, spices and honey and wax, little information is available on management of the forest resources such as herbaceous plants, shrubs or trees for NTFPs (Mulugeta, 2006). Only few studies have been conducted on the importance of NTFPs in Ethiopia from the lowlands, from the southwestern moist forest and eastern highlands (Mulugeta et al., 2003; Tadesse and Ararsa, 2004; Tsegaye *et al.*, 2004).

No study has been conducted in relation to NTFPs in Jello-Muktar Afromontane. Early studies of this forest focused on the soils, management of the forest, and land use/ land cover change of the forest (Mohammed *et al.*, 2005; Murphy 1968; Eyelachew 1999; Park *et al.*, 2001).

Yet, the types of NTFPs found in Jello-Muktar forest, and their socio economic contribution has not been studied at all. This study, therefore, aims to explore NTFPs resources and the roles they can play in improving the livelihood of households in the Jello-Muktar forest area, which may be used as a strategy for the conservation of the forest.

## 2. Materials and Methods

### Study Site

The study site is situated in Jello-Muktar protected forest between 8°55'N-9°05'N latitude and 40°50'E-40°51'E longitude, about 342kms south-east of Addis Ababa. Its altitude ranges from 1900 to over 3310 m.a.s.l, having subtropical climatic condition with mean annual temperature of 10°C and mean rainfall of 1220mm. Its length of growing period ranges from 210-270days (MOA/FAO/UNDP, 1983). The crystalline basement rocks form the geological formation overlain by Mesozoic and Cenozoic tertiary volcanic rocks to mantle the surface of most parts of the study area (Mohr 1971 in Mohammed, 2003). Limestone and sandstone were also deposited upon the Precambrian basement rocks (Eyelachew, 1999). It is part of the Chercher highlands in Hararge with extensive mountain range separating the Rift system from the Eastern plateau and lowlands, having numerous micro-catchments with diversified bio-physical and socio-economic environments (Eyelachew, 1999; Murphy, 1968).

The total area of the forest is about 7500ha of which 1700ha is currently administered under Participatory Forest Management (PFM). It was once covered by tropical highland forests in south-eastern Ethiopia. During the imperial regime, foreign private organization planted forest miller in the sub-catchment for timbering. After timber plant failed to continue due to deforestation, smallholding farmers encroached to the mountain forest area for settlement, farming and livestock production. After severe deforestation, around early 1980s, it becomes state forest protection area where plantation of monoculture afforestation occurred. In the last four decades or so, 'common-resource' management approach was implemented where farmers freely encroached for farming, livestock rearing, domestic and commercial purposes. This was aggravated by frequent changes of government and gap in administrative roles of central government, namely early 1970s and 1990s. It was one of the areas in the Hararge highlands of Ethiopia where Community Forestry Practices (CFP) projects were undertaken.

Since 2010, PFM approach has been initiated by the Oromiya Forestry and Wildlife Enterprise in collaboration with the German Technical Cooperation (namely GTZ) with active participation of all stakeholders and the local community. There is an eco-tourism activity in the forest due to the presence of wild animals like Mountain Nyala, Menelik Bush Buch, Leopard, Hyena, Black and White Monkeys, Warthogs, numerous birds and diverse floras. Every two years, inventory of wild animals is conducted by experts and community representatives. Based on their quota, controlled-hunting of Mountain Nyala and Leopard is permitted for tourists.

According to the Oromiya Forestry and Wildlife Enterprise, continued awareness creation and experience

sharing activities were made to convert strong opposition of farming community about PFM. Community closer to the forestland had been organized into PFM based on their proximity, small landholding, poor economic status, volunteer to participate in the program. Activities of the PFM include bee keeping, livestock fattening, following up zero-grazing, cut and carry system of grass and collection of income from eco-tourism.

### Data collection

The collection of socio-economic data was conducted by both formal and informal survey. Prior to starting the actual survey, preliminary assessment was done with the key informants to get background information about the households living in and around the forest and the villages which are nearest and afar away from the forest. Information on the traditional use of NTFPs and the importance of Jello-Muktar forest as a source of NTFPs was assessed from surrounding communities by means of household interviews, discussions with key informants, focus-group discussions and personal observations.

Households were stratified according to *their* wealth category; rich, medium and poor; and patterns of NTFPs use between them were examined. The heads of households were taken as key informants as they provide more information about the households living in their respective villages. The key informants identified farm size owned by each households and the tax they pay as the parameters used for the stratification of the households in to wealth categories.

A formal household survey covering 90 households representing 10% of the households in the selected villages was conducted. Men and women were interviewed separately to give women more freedom to express themselves, given the inherent division of labour between men and women in the society under study. Within this sampling strategy proportional allocation of each wealth category was conducted.

Collection of socio-economic variables like; age of the household head, off-farm activities, educational status of the head of the household, number of women in the household and number of cattle possessed by the households were also assessed. Distance of the villages to the forest base as a source of NTFPs was also taken as another factor considered affecting utilization of NTFPs. Four villages in the vicinity of the forest were randomly selected of which two villages are adjacent to the forest, and the other two are behind the nearest villages.

Survey of four local markets (Chiro, Hirna, Qun'i and Badessa) was also conducted to: assess collection of data about the number of NTFPs sellers involved in each selected market place, the type of products supplied to these markets and to provide information on the importance of NTFPs to the household economy, as a means of supplementing gaps in the household survey. This activity was conducted by personal observation and informal discussion undertaken with members of the participating NTFPs sellers in the respective markets.

### Data analysis

Data from the key informant interview, group discussion, and informal survey parts were analyzed qualitatively. However, the data collected from different variables such as wealth category and proximity to the resource base was treated as a factor and utilization of NTFPs (product types such as, traditional medicine, fuelwood, honey, household utensils, etc., and use categories such as household use and income generation) had been treated as dependent variable. The household data were analyzed using regression analysis, a statistical analysis procedure that allows relationships to be identified between some measure of interest such as profitability of the NTFP marketing and one or more explanatory variables. In order to test which socio-economic variables influence NTFP dependency an ordinary least square (OLS) regression was conducted. The variables tested were: village, age of household head, formal education of household head, female labour resources (proxy: number of women in the household), off-farm income, farmland size and number of cattle per household. Comparison of contribution of NTFPs to household income between wealth categories was measured as the share of income from NTFPs in total household income (relative NTFP income).

Data from the market assessment were analyzed by means of descriptive analysis. Because of the nature of the survey is informal, most of the information collected were qualitative, except that concerning the number of people involved in the sale of NTFPs. The results were quantified, coded and tested by ANOVA. Micro-soft EXCEL and SPSS version 16 Software were used for analyzing the data.

## 3. Results and Discussion

### 3.1. Socio-economics of NTFPs extraction from Jello-Muktar Forest

All interviewed households engaged in the collection of NTFPs with varying degrees of dependency. This high importance of NTFPs is reflected in the households' economies. There have been about nine NTFP that are utilized by the communities around Jello- Muktar forest. However, the degree of utilization of these NTFPs varies from product to product. The five NTFPs most utilized in the Jello-Muktar forest are fuelwood, household utensils, traditional medicines, farm implements, and honey bee flora while spices and wild foods were found to utilized by least number of respondents (3% each) (Figure 1).

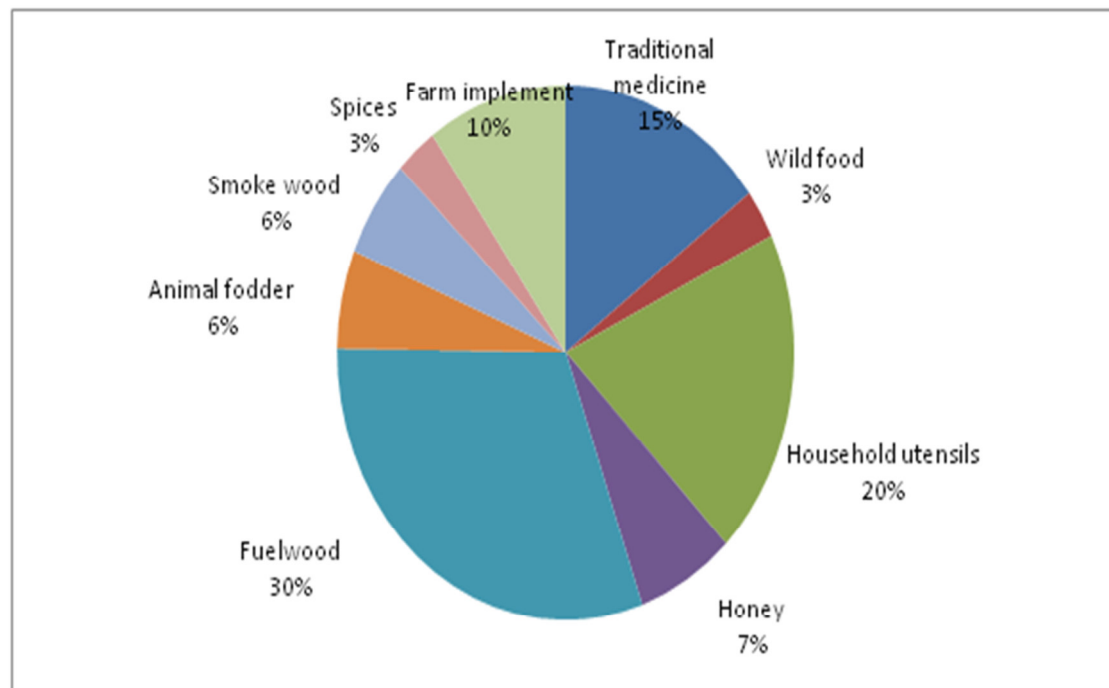


Figure 1. Proportion (%) of respondents using different NTFPs in and around Jello-Muktar forest, Eastern Ethiopia (n = 90).

The NTFPs identified for Jello-Muktar forest were supporting the livelihoods of the communities in and around the forest in several ways. In the study area, the most important value of NTFPs lies on their traditional and subsistence uses (such as medicines, household utensils, farm implements, fuelwood, honey, wild foods, spices and animal fodder) and secondly for income source through trading on local markets. Dependency on wild food is limited in Jello-Muktar forest area due to the communities are more depends on subsistence agriculture and cash crops such as chat (*chat edulisforsk*) than collection of wild food for their household food security.

### 3.2. Effect of socio-economic variables on utilization of NTFPs

The most important factors (both in magnitude and significance) likely to reduce NTFP dependency of households in and surrounding Jello-Muktar forest areas are i) greater land holding, i.e. higher crop production and appropriate income (which is proved by a significant correlation between farmland size and crop income ( $p < 0.01$  and  $P < 0.05$ ) and ii) off-farm activities (Table 1). On the other hand, the more women belong to a household and the older the households' head, the higher relative income from NTFPs, which is explained by very low opportunity costs of NTFP extraction activities and, for the case of age, by the experience concerning these activities.

Table 1. Regression of relative NTFP income against socio-economic variables Term (n=90)

NTFP	Socio-economic factors						
	Farm size	Number of women in household	Distance from the forest	Age of the head HH	Education status of the HH	Number of Cattle	Off-farm income
Traditional medicine	0.31*	0.33**	0.61ns	0.78**	0.10ns	0.39ns	0.38*
Wild food	0.49*	0.35*	0.19ns	0.45*	0.06ns	0.25 ns	0.51**
Animal fodder	0.37**	0.47*	0.19ns	0.38*	0.04ns	0.57**	0.41*
Fuelwood	0.44**	0.67**	0.54ns	0.34*	0.35ns	0.30 ns	0.63*
Honey	0.42ns	0.19ns	0.52ns	0.43**	0.36ns	0.15 ns	0.79ns
Household utensils	0.32*	0.21ns	0.05ns	0.81**	0.06ns	0.63*	0.31**
Farm implement	0.46**	0.17ns	0.06ns	0.75*	0.06ns	0.70*	0.40*
Spices	0.61*	0.48**	0.63ns	0.83**	0.12ns	0.52ns	0.67*
Smoke wood	0.53*	0.54**	0.16ns	0.52*	0.02ns	0.43*	0.46*

Note: ns=not significant; \*, \*\*= Correlation is significant at  $P < 0.05$ ,  $P < 0.01$  respectively, HH=head of the household

Additionally, since fodder forms an important NTFP income category, a greater number of cattle is significantly reflected by a higher NTFP dependency. In contrast distance of the village from the forest and education showed no significant effects on NTFP dependency and utilization, indicating that market size does not influence the extent of NTFP extraction activities and formal education is not important regarding NTFP extraction activities.

Some earlier conducted studies agree on the fact that wealthier households are more engaged in the extraction of NTFPs in quantitative terms (Shackleton and Shackleton, 2006) hypothesizing that they are better equipped to extract certain high-value resources, have greater access to markets and are better connected to trade

infrastructure than poorer households.

Many articles support the idea that poorer households derive more benefit from the use of NTFPs than do wealthy or intermediate households do. One reason suggested for this difference is that due to lack of cultivable land and formal job, a greater proportion of poor households involving in the collection and sale of one or more NTFPs compared to wealthy and intermediate households (Neumann and Hirsch, 2000; Shackleton and Shackleton, 2005).

The present study also confirmed that differences on the utilization of NTFPs were statistically significant among different wealth with respect to the variables of local wealth categories.

### 3.3. Contribution of NTFPs to household income

Poor households are relatively more dependent on NTFPs than medium and rich income households. Dependency in this regard displays the need to fulfil basic diet needs through collection of NTFP which is most appropriate with the poorest households.

The income that is generated from the sale of NTFPs ranged from 800 Birr for the rich households to 1651.0Birr for the poor households per annum (Table 2).

These incomes compared to the other income sources of the households constitute only 4% for the rich households and about 36% for the poor households. The income generated from the sale of NTFPs was significantly different among the wealth groups ( $P < 0.05$ ). The utilization of NTFPs for income generation was increasing for the poorer wealth groups. Conversely, income share from cash crops increased significantly with total income (25%, 70% and 73% for the poor, medium and rich households respectively) indicating that the higher the crop income the lower the NTFP income. The mean contribution, across all wealth categories, from the sale of NTFPs was about 1204 Eth. birr per household.

**Table 2. Household income (in Eth. birr) by income source and wealth categories (n=90)**

Table 2: Household income (in Birr BBT) by income source and wealth categories (n = 56)								
Wealth categories							Total	Annual Share (%)
1. Poor		2. Medium		3. Rich				
Income source	Mean income	Income shares (%)	Mean income	Income shares (%)	Mean income	Income shares (%)		
Cash Crops	1150	25	9515	70	12933	73	23698	66.08
Fattening	550	12	1246	9	1908	11	3704	10.37
Off-farm	1200	26	1600	12	2000	11	4800	13.44
NTFP	1651	36	1160	9	800	4	3611	10.11
<b>Total</b>	<b>4551</b>	<b>100</b>	<b>13521</b>	<b>100</b>	<b>17621</b>	<b>100</b>	<b>35713</b>	<b>100</b>

Referring to the income studies which calculated income from the same NTFPs to this study (firewood, fodder, wild food items, medicinal plants) the figure of 10.11% NTFP income is comparatively lower when compared to Babuloet *al.* (2009) where the share of NTFP income in total income to be 27 %. However, the contribution of the income from sale of NTFPs in Jello-Muktar forest area was considerable. In many rural areas of Ethiopia, trade on NTFPs is one of the most important ways of making livelihoods for those who have no other means of income (Amare, 1976).Hasalkar and Veena (2004) also supported this idea in that NTFP supplies the needs of people livelihood in and near forests more than timber products. This is because forest products for sawn-timber are protected to contribute to the revenue of the national economy and could not be allowed to be harvested by individual community members, while, collection of NTFPs is a day-to-day activity of many forest dwelling community.

### 3.5. Market assessment of NTFPs

A market survey for NTFPs in four local markets surrounding Jello-Muktar forest revealed that honey,fuelwood, spices, traditional medicines, household furniture, smoke woods, farm implements and structural materials were traded. The mean number of sellers for each of the NTFPs per market day in these four local markets is summarized in Table 3.



**Table 3. Mean Number of NTFP sellers in four-market areas around Jello-Muktar forest by type of products**

S/N.	Product type	Market areas				Total
		Qun'ii	Mi'esso	Badesa	Chiro	
1	Medicinal plants	6	3	13	17	39
2	Honey	12	3	11	18	44
3	Farm implements	6	9	13	15	43
4	Fuel wood	14	8	18	21	61
5	Wild food	3	-	2	4	9
6	Spices	7	5	4	12	28
7	Household utensils	3	6	13	7	29
8	Construction materials	12	9	12	14	47
9	Smoke and flavoring wood	12	6	8	14	40
<b>Total</b>		<b>75</b>	<b>49</b>	<b>94</b>	<b>122</b>	<b>340</b>

Of the four markets, the largest proportion of NTFP sellers (122) was observed for Chiro followed by Badesa (94). The lowest number of NTFP sellers (49) was observed at Hirna market.

Local markets play a significant role in enabling rural households to realize a considerable part of their cash income through sale of NTFPs. In this study, about 430 individuals per marketing day were involved in the sale of different types of NTFPs in four local markets around Jello-Muktar forest. This figure was almost comparable to the community engaged in the sale of NTFPs reported from Cameroon where many rural households involved in the collection and sale of NTFPs (Ndoye, *et al.*, 1998). Observation during field work also showed that women were more involved in the sale of NTFPs than men particularly for medicinal plants, fuelwood, smoke wood and spices. Thus, NTFPs support the community not only through the provision of cash income but also served as a source of employment for a large number of people particularly for marginalized women. The results of this study are in line with studies made on medicinal plants in central Ethiopia where 95% of the people selling medicinal plants at Ethiopian markets were women (Cunningham, 2001).

Similar study from Cameroon where NTFPs marketing are widely practiced, the vast majority (94 %) of traders of NTFPs is women (Ndoye *et al.*, 1998). The reason for the involvement of NTFPs by women more than men may be attributed to common understanding that NTFP trade is traditionally considered as a marginal activity reserved for women and children. With respect to forest conservation and development utilization of NTFPs by women is much better than the men members of the community do. Because resource use by women is non-destructive as compared to the men as they depend on the collection and sale of NTFPs and small-scale forest industries for income. In contrast, men work in commercial forestry, construction, and forest-based industries, and less in subsistence activities, except for hunting which creates greater pressure on the forest environment. Moreover, men are greatly involved in cutting large trees, clearing land for agriculture, and extracting commercial timber. This is also true for Jello-Muktar forest where the community has cleared thousands of forestland for crop production during the last decade. Nevertheless, the remaining patches of the forest still significantly contributed to the surrounding community through the production of different types of NTFPs for subsistence and income generation and most of the time the women were observed to engage in these activities for income generation activities.

### 3.6. Management Implications of NTFPs for Forest Resource Conservation

The inadequate information on the ecology and physiology of NTFP species is the major drawback to initiatives aimed at managing the resource base. Though there have been some successes, these do not equally match the rate at which the NTFP sector is developing. The enactment to control harvesting at our study sites has been adopted by Oromia Forest and wildlife enterprise.

The forest is now divided in blocks depending on the carrying capacity and given to the surrounding community as participatory forest management (PFM). In each block different cooperative unions are established for the best utilization of NTFP as well as sustainable conservation of the forest. Each PFM members have established and post its own tapela showing the names of cooperative unions with number of members including sex wise. Each cooperative union has the right to utilize the different NTFPs like: grass, hanging beehives etc. depending on their agreement with the Oromia Forest and Wildlife enterprise Hararghe branch.

A market approach should be applied as means of assuring sustainability of NTFP harvesting. This approach maintains that improved producer prices, adding value locally to NTFPs, and organizing people to manage the resources on their own may lead to sustainable utilization, and can therefore lead to the goals of long-term economic rights of people to access NTFPs and commercialization (Nepstad, 1992; Stiles, 1994).

In the context of this study however, given that harvesting of NTFPs occurred even in protected areas, there is little doubt that NTFPs can only be sustainably managed if economic alternatives and incentives other than those coming from the NTFP sector are developed to meet the actual needs of the local people. This will require

appropriate incorporation of livelihood activities into participatory forest management (CBF) practices with recognition and management of NTFPs.

#### 4. Conclusion and Recommendation

There have been about nine NTFPs that are utilized by the communities around Jello- Muktar forest. However, the degree of utilization of these NTFPs varies from product to product. The five NTFPs most utilized in the Jello-Muktar forest area are fuelwood, household utensils, traditional medicines, farm implements, and honey bee flora. A considerable and significant share of NTFP income can be found within the poor wealth categories. It reveals, on the one hand, a shift in income shares of total household income: *e.g.* the decrease of farm land that provides cash crops and livestock income presumably led to a corresponding increase of NTFP income. The socio economic survey results showed that all households living in and around the forest used one or other types of NTFPs. However, more dependency was observed on the utilization of three types of NTFPs. The three NTFPs, which are commonly used by most of the respondents are, fuelwood, household utensils and traditional medicines. Local markets play a significant role in enabling rural households to realize a considerable part of their cash income through sale of NTFPs. Thus, NTFPs support the community not only through the provision of cash income but also served as a source of employment for a large number of people particularly for marginalized women.

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